Function Tables With The Magic Function Machine

Brief Overview:

> **Students will be able to complete a function table by applying a one operation rule, determine a rule based on the relationship between the input and output within a function table, and will create and use function tables in order to solve real world problems. Students will engage in real world problem solving using the Internet.**

NCTM Content Standard**:**

> Algebra
> **Understand patterns, relations, and functions**
> - **Represent and analyze patterns and functions, using words, tables, and graphs**

Grade/Level:

> **Grades 3 and 4**

Duration/Length:

> **Two 90-minute lessons**
> **Lessons can be spread over the course of 3 days**

Student Outcomes:

> **Students will:**
>
> - **Complete a function table using a one-operation (+, -, x, ÷ with no remainders) rule (Use whole numbers 0-50); Grade 3 can complete a function table using a given addition or subtraction rule**
> - **Describe the relationship that generates a one-operation rule**
> - **Create a one-operation (+ or -) function table to solve real world problems**

Materials and Resources:

> **Lesson 1**
> - **Magic Function Machine**
> - **Digit cards made on index cards**
> - **Index Cards**
> - **Markers**
> - **Dry erase markers (one per student)**
> - **Erasers (one per group; one piece of felt or tissue per student)**

- **LCD Projector or other computer projection device**
- **Computer connected to the projection device**
- **Copies of Student Resource 1 (one per student)**
- **Spider Cards for Teacher (Teacher Resource 2)**
- **Spider Leg Cards for Teacher (Teacher Resource 3)**
- **Large horizontal and vertical function table (poster for the board or drawn on the board with chalk)**
- **Page Protectors (one per student)**
- **Copies of Student Resources 2 and 3 (one per student, placed back to back in the page protector)**
- **Overhead of Teacher Resources 5a & 5b**
- **Observation Checklist #1, Teacher Resource 6**

Lesson 2
- **Magic Function Machine**
- **Digit cards made on index cards (from previous lesson)**
- **Dry erase markers (one per student)**
- **Erasers (one per group; one piece of felt or tissue per student)**
- **Dry Erase Boards or other All Pupil Response Board (one per student)**
- **Copies of Student Resource 1 (one per student)**
- **Large horizontal and vertical function table (poster for the board or drawn on the board with chalk)**
- **Mini Magic Function Machine (one per pair or student), Teacher Resource 7**
- **Copies of Student Resource 6 (one per student)**
- **Observation Checklist #2, Teacher Resource 8**

Summative Assessment
- **Copies of Student Resources 7a & 7b (one per student)**

Development/Procedures:

Lesson 1
Pre-Assessment
- **Distribute Student Resource 1 and ask students to fill in the blank boxes with the appropriate numbers. See Teacher Resource 9 for the answer key.**
- **Circulate throughout the room and monitor students' responses to determine their strengths and needs in regard to number patterns, problem solving strategies, and using function tables.**
- **Provide students with opportunities to share their responses and strategies with the class.**

Launch

- **Introduce the students to the Magic Function Machine. Refer to Teacher Resource 1, Directions for Magic Function Machine. The teacher will need to use index cards to make digit cards to use with the Magic Function Machine throughout both lessons. The digits needed on the cards will depend on the numbers used in the lesson.**
- **Explain to students that when you put numbers in the Magic Function Machine another number comes out. The machine has a function or a rule it follows every time you put a number in. Something happens inside the machine so depending on the number you put in a certain number will come out. The machine has a function or rule that it follows for each number you put in. Use the problems from the pre-assessment to demonstrate how the machine works.**
- **Stand inside the box so that you are in control of the output. Ask a student to place one spider through the input slot (At this time you might not want to refer to that slot as the input since the vocabulary has not been introduced). Refer to Teacher Resources 2 and 3 for the pictures of the spiders and the spider legs. Tell the student who put the spider in the box to take what you pass him/her. Pass 8 spider legs (1 spider legs card) through the output to the student. Ask the student to hold the picture of the legs up for the class to see and tell the class how many spider legs there are in all. Tell the students that every time you put 1 spider in the machine 8 spider legs will come out.**
- **Record the numbers on a table on the board. (A student can be the recorder). You can tape the pictures next to each of the numbers to provide a visual for students who will need it.**
- **Choose another student to place 2 spiders through the input and pass 16 spider legs (2 spider legs cards) to him/her. Record the numbers on the table on the board. Ask the class what relationship they notice between the number of spiders and the number of spider legs. Ask the students how we can figure out how many spider legs a given amount of spiders will have. Students may use many strategies to explain the relationship between the two numbers and how they can determine the output (skip counting, repeated addition, multiplication, hundreds chart, counting the legs on the pictures, etc.)**
- **Continue using the spiders as a visual example for students to begin to see the relationship between the input and the output.**
- **Refer to the objective and discuss with students that today they will be working with function tables and looking closer at the relationship between the numbers in a function table. They will also use the function table to help solve problems.**

Teacher Facilitation

- **Display a vertical function table and a horizontal function table on the board and label the parts of the tables with sentence strips labeled with the vocabulary words: function table, input, and output.**

- **Build an understanding of the term, relationship, by referring to Teacher Resource 4 for a brief and engaging vocabulary activity.**
- **Explain to students that function tables are helpful when you are trying to solve problems because you can look for number patterns. When you use a function table it is really important to look for the relationship between the input and the output. Refer to an example from the function tables that are displayed with the vocabulary labels to help the students understand how the input relates to the output.**
- **Inform students that today they will be using function tables and the Magic Function Machine to help determine how much money Larry made at his Lemonade Stand.**
- **Display the website http://www.prongo.com/lemon/game.html using an LCD projector or other projection device so the entire class can see the screen. This website will provide the scenarios for each function table that the students will be doing today. If your school does not have an LCD projector, you can print the pages from the website and make overheads to display each problem for the class.**
- **Display a blank vertical function table and a blank horizontal function table to reuse throughout the lesson.**
- **Use the Think Aloud strategy to model how to complete the function table for the first lemonade problem displayed on the projector. The first problem on the website varies each time you play the game. This is an example of what you would say if 1 cup of lemonade costs 4 cents.** *Looking at Larry's sign I know that one-cup of lemonade costs 4 cents. So I am going to write 1 in the input and 4 in the output.* **Place the digit cards in and out of the machine as you say:** *When I place 1 in the Magic Function Machine I know a 4 will come out because 1 cup costs 4 cents. The machine has a rule or function that it follows.* **Record the numbers on the blank function table.** *I can see that the output is greater than the input. If I put 2 in the machine I think that 8 will come out. I know that 8 will come out because the rule is that 1-cup costs 4 cents so 2 cups will cost 4 + 4, which is 8 cents. I can see that the output is greater than the input again. If I put 5 in the machine I think 20 will come out because I still know that 1-cup costs 4 cents and that the output increases each time. I know to make a number larger I have to add or multiply. So I can add 4+4+4+4+4=20 to get my answer. I could also skip count by 4s to get my answer because 1 cup costs 4 cents so 4,8,12,16,20 which means that 5 cups cost 20 cents. I also see that 4 to get the output can multiply each input.   4 x 5 = 20.*
- **Record the answer on the displayed website to check to make sure that it is correct. A new problem will then be displayed.**
- **Guide students through the next displayed lemonade problem by questioning. As you ask each question give students an opportunity to share with a partner before sharing with the class (Think-Pair-Share). Some possible questions to guide the discussion include:**

- If we put 1 in the input what will come out of the output? So 1 cup of lemonade = ____ cents. Students will need to look at the displayed website to determine this.
- If we want to know how much 2 cups of lemonade cost and we put 2 in the input, what will the output be?
- Explain how you determined the output.
- What relationship do you see between the input and the output?

- **Provide students with opportunities to use both horizontal and vertical function tables so they are comfortable working with both. Provide opportunities for students to solve more lemonade problems by displaying the next problem on the lemonade website. Allow students to apply the skill of completing the output of the function table.**

- **Bring the class together and follow the procedure above to model and practice the concept of completing the input of the function table when the rule and the output are given. You can use the dog function table used as the pre-assessment to model the process. Use the Magic Function Machine to help build an understanding. You will not be able to use Larry's Lemonade Stand website for this portion, but you can still present lemonade stand problems for students to continue to make real world connections with the function table. One possible problem is: If 1 cup of lemonade (input) costs 3 cents (output) [Use to determine the rule], how many cups of lemonade (unknown input) will cost 9 cents (output)? Record the numbers in the function table as you are working through the problems.**

Student Application

- **Distribute page protectors with a vertical function table, Student Resource 2, on one side and a horizontal function table, Student Resource 3, on the other side. This will serve as dry erase boards to be used throughout the lesson. Distribute a dry erase marker and eraser to each student.**

- **Present more problems from the website and provide students with the opportunity to use their page protector dry erase function tables to demonstrate their understanding.**

- **Provide additional practice allowing students to complete the input when the output is given. Create an overhead of Teacher Resource 5a & 5b, Lemonade Stand- Output Practice, to display additional practice problems. Practicing of this concept should be after the teacher has modeled and practiced the concept with the students as a group.**

Embedded Assessment

- Observe students' responses on their dry erase boards to determine understanding.
- Observe the students problem solving skills, understanding of the concept, and arithmetic skills and complete the checklist, Teacher Resource 6, Function Table Checklist #1, as you notice students struggling with these areas.

Reteaching/Extension –

- Reteaching: Use pictures of objects to help the students better understand the function tables. Refer to the example used earlier in the lesson that required using pictures of spiders and pictures of the spider legs. You can use body parts so that the struggling students can be kinesthetically involved. For example, ask one student to stand in front of the group (input) and then determine the number of eyes (output). Complete a function table showing the relationship between the number of students and the number of eyes. Ask other students to stand up as you complete the function table. You can tell students to count the number of eyes as several students stand in front of the group.
- Extension: Use function table cards and the Rule Spinner, Student Resources 4, Spinner- Function Tables and Student Resource 5, Function Table Spinner, to practice completing function tables.

Lesson 2
Pre-Assessment/Launch

- Use the Magic Function Machine from the previous lesson and display the blank horizontal and vertical function tables on the board to use throughout the lesson.
- Ask a student to put a digit card with a number larger than 1 through the input of the Magic Function Machine.
- Stand in the box and pass a number through the output to the student.
- Record the numbers in one of the function tables on the board.
- Repeat the process above with 2 other numbers.
- Ask students to discuss with their groups what rule or function is happening in the machine. Yesterday all of our inputs started with 1. When we start with a different number it's a little harder to complete the table. Tell students to look at the relationship between the input and output to figure out what is happening.

- Ask groups to share their responses with the class. Require students to explain how they got their answer and why their answer is correct. Be sure to ask students to give specific examples to support their ideas.

Teacher Facilitation

- Review vocabulary (function table, input, output, relationship, and rule) from the previous lesson by referring to your labeled function tables and discussing examples shared during the previous day for rule and relationship.
- Model finding the rule in a function table by using pattern blocks. Place 3 triangles side by side on the board.

Observe that 3 triangles have 9 sides. Record in the function table the number of triangles (input) 3 and the number of sides of the triangles (output) 9. Place 2 more triangles on the board.

Record the numbers in the function table 5 (input) 15 (output). Place 2 more triangles on the board.

Record the numbers in the function table 7 (input) 21 (output).

- Use the Think Aloud strategy to model how to identify the rule in the function table. *I know that I need to look at the input and the output to try to figure out what is happening. I have to look at the relationship*

between the numbers or how they are connected. I see that the output is greater than the input. The output is increasing. When a number increases I know that you have to add or multiply. The rule has to do with adding and/or multiplying. If the input is 3 and the output is 9, I know that I can use repeated addition, 3 + 3 + 3=9. I know that I can also skip count by 3 to get 9. 3, 6, <u>9</u>. I also know that I can multiply the input by 3 to get the output, 3 x 3 = 9. Those are three strategies I can use to find the rule. I need to try this with another input to make sure that this is really the rule. If I multiply the input, 5, times 3, then I get the output, 15. If I multiply the input, 7, times 3, then I get the output, 21. Multiplying by 3 works every time so the rule for this function table is multiply by 3. **Record the rule above the function table.** *So 1 triangle has 3 sides and 100 triangles have 300 sides. I can figure out the number of sides any amount of triangles has because I know the rule for this function table.* **Students can also use the pattern blocks to count the total number of sides for the given amount on triangles if they need to see the rule in a concrete manner.**

- **Complete another function table using a different pattern block. Ask students to assist you in completing the function table.**
- **Guide the students through the process of identifying the rule for the function table by questioning. As you ask each question give students an opportunity to share with a partner before sharing with the class (Think-Pair-Share). Some possible questions to guide the discussion include:**
  - **Is the output increasing or decreasing compared to the input? What does this mean?**
  - **What relationship do you see between the input and the output?**
  - **What strategies can we use to figure out the relationship between the input and output?**
  - **How can we be sure that the rule we write is correct?**
- **Distribute dry erase boards or mini-chalkboards where students can record their responses.**
- **Model for students how to find the rule when you don't have the pattern blocks to count the sides. Use the Magic Function Machine to put various numbers in and out of the machine. Record the numbers on a function table. Students can record their rule on their dry erase board. Students should be required to explain how they got their answer and why their answer is correct with a partner and then share with the class.**
- **Provide students with opportunities to use both horizontal and vertical function tables so they are comfortable working with both.**
- **Create several problems in context so that students get sufficient practice in identifying the rule of a given function table. You can provide the scenarios and complete the function table as a class. Then, students can write the rule for the function table and solve the problem. One real world example that can be used with students is:**

Fred wants to purchase 10 video games and he wants to know how much the video games will cost if he purchases them from the store, Best Electronics. Two games at Best Electronics cost $24, 4 games cost $48, and 7 games cost $84. What can we do to figure out how much 10 video games will cost Fred? (rule)

Student Application

- **Students will use their individual Magic Function Machine to find the rule for several function tables. Refer to Teacher Resource 7. They will record their responses on the Magic Function Machine Recording Sheet, Student Resource 6.**

Embedded Assessment

- **Observe students responses on the dry erase boards.**
- **Observe the students problem solving skills, understanding of the concept, and arithmetic skills and complete the checklist, Teacher Resource 8, as you notice students struggling with these areas.**
- **Collect and review students' Magic Function Machine Recording Sheet.**

Reteaching/Extension

- **Reteaching: Provide students with more opportunities finding the rule when given concrete objects, similar to the problems used earlier in the lesson that used pattern blocks. Some possible activities include:**
  - **Folding a paper and creating a function table with the input being the number of folds and the output being the number of parts the paper is separated into. 1 fold (input)- 2 parts of paper (output) (Burns, 2000, p. 116)***
  - **Drawing 1 point to represent the input and the number of line segments will be the output, 0. 2 points (input) 1 line segment (output) (Burns, 2000, p. 117)***

*Adapted from *About Teaching Mathematics: A K-8 Resource* (2000) by

Marilyn Burns

- **Extension:**
  o **Give students completed function tables and require them to write the rule for each function table and then create a real world situation that could be used along with the numbers in the function table.**

Summative Assessment:
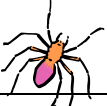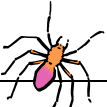
Students will complete a summative assessment, Student Resources 7a & 7b, Function Tables, that consists of two selected response questions that require the students to complete the output of a function table when given the input and a question that requires students to complete the input of a function table when given the output. The students will also have to complete a BCR where they will have to identify the rule for the given function table and then explain why their answer is correct. Note to teacher: Teacher Resource 9, Answer Key for Student Resources, is the answer key for the summative assessment and all of the other resources.

Authors:

Jenifer B. Noll
Owings Mills Elementary School
Baltimore County Public Schools

Suzanne M. McCurdy
Pinewood Elementary School
Baltimore County Public Schools

Complete the table below.

Number of Spiders	1	3	6	9
Number of Legs	8			

Complete the table below.

Number of Dogs	Number of Legs
1	4
	8
	16
	24

Name _____**Date** _____

Rule: _____

Input	Output

Rule: _____

Input					
Output					

Spinner-Function Tables

Rule:	
Input	**Output**
84	
18	
72	

Rule:	
Input	**Output**
	30
	120
	60

Rule:	
Input	**Output**
36	
42	
108	

Rule:	
Input	**Output**
	6
	24
	102

Rule:	
Input	**Output**
78	
42	
66	

Rule:	
Input	**Output**
	90
	48
	54

Rule:	
Input	**Output**
66	
114	
96	

Rule:	
Input	**Output**
	108
	54
	36

Rule:	
Input	**Output**
12	
54	
108	

Function Table Spinner

Rule: ÷ 6	Rule: × 10
Rule: × 3	Rule: + 8
Rule: + 23	Rule: × 5

✂ -

Function Table Spinner

Rule: ÷ 6	Rule: × 10
Rule: × 3	Rule: + 8
Rule: + 23	Rule: × 5
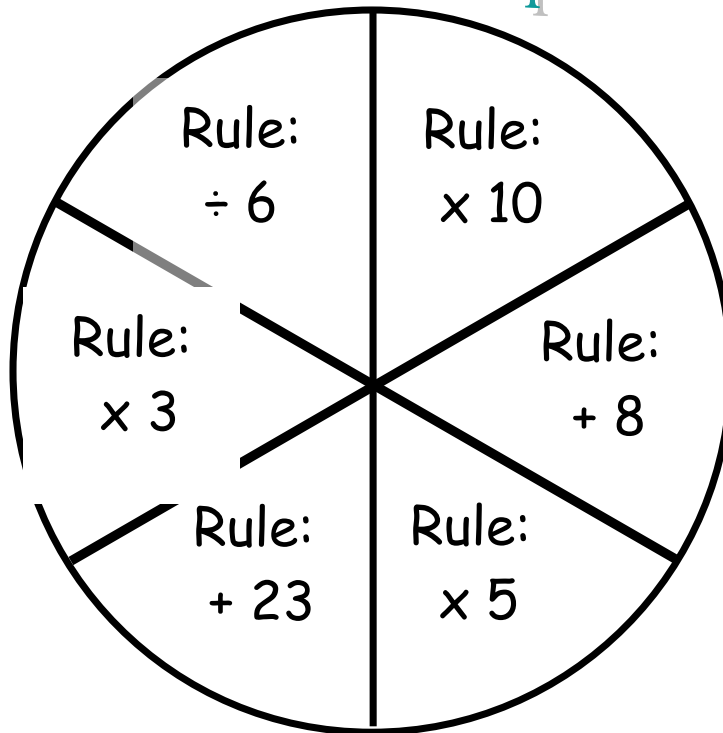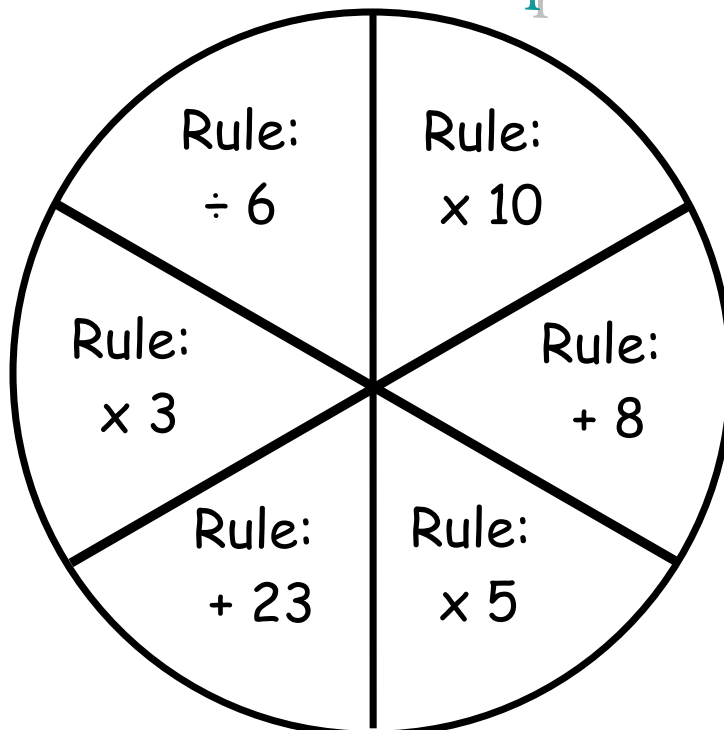
Magic Function Machine Recording Sheet

Directions: Use your Magic Function Machine to identify the inputs and outputs of the number strips. Record the inputs and outputs in the function tables below and write the appropriate rule for the function table.

Rule:

Input	Output

Rule:

Input	Output

Rule:

Input	Output

Rule:

Input	Output

Rule:

Input	Output

Rule:

Input	Output

Name _____   **Date** _____

Function Tables

Name _____   Date _____

1. **The function table below shows the cost of tickets at the Fun Rides Amusement Park.   One ticket costs $17.**

Number of Family Members	Total Cost for Tickets
1	$17
2	$34
5	$85
9	

Choose the number to complete the function table to find how much 9 tickets will cost.

Ⓐ **$8**

Ⓑ **$102**

Ⓒ **$136**

Ⓓ **$153**

2. **The function table below shows the cost of DVDs at Video City. Each DVD costs $9.**

Number of DVDs	Total Cost for Tickets
1	$9
2	$18
	$36
7	$63

Choose the number to complete the function table to find how many video games will cost $36

3

4

5

6

3. The function table below shows the cost of video games at Electronic City. The input shows the number of video games and the output shows the cost for the video games.

Input	Output
6	$42
8	$56
11	$77
13	$91

Part A
Write the rule for   the function table.

_____

Part B
Use what you know about function tables to explain why your answer is correct. Use numbers and/or words in your explanation.

_____

_____

_____

_____

_____

Magic Function Machine Directions

Materials:

Magic Function Machine

- **Large Box that a student can sit in (a paper towel box or appliance box)**
- **Light Switch or object that we used to create a knob that can turn "on" and "off"**
- **Hot Glue**
- **Utility Knife**
- **Decorations (optional)**

Digit Cards

- **Index Cards**
- **Markers**

Directions:

1. Cut the 4 top flaps off of the box. Cut one entire side off of the box so that you or a student can easily move in and out of the box.

Cut flaps

Cut flaps

Cut entire
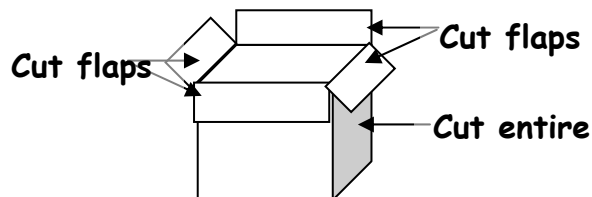
2. Cut two 5 in. by 3 in. rectangular slots on one of the sides of the box. The slots should be next to each other and about 10 in. apart (depending on the size of the box).
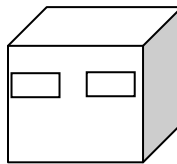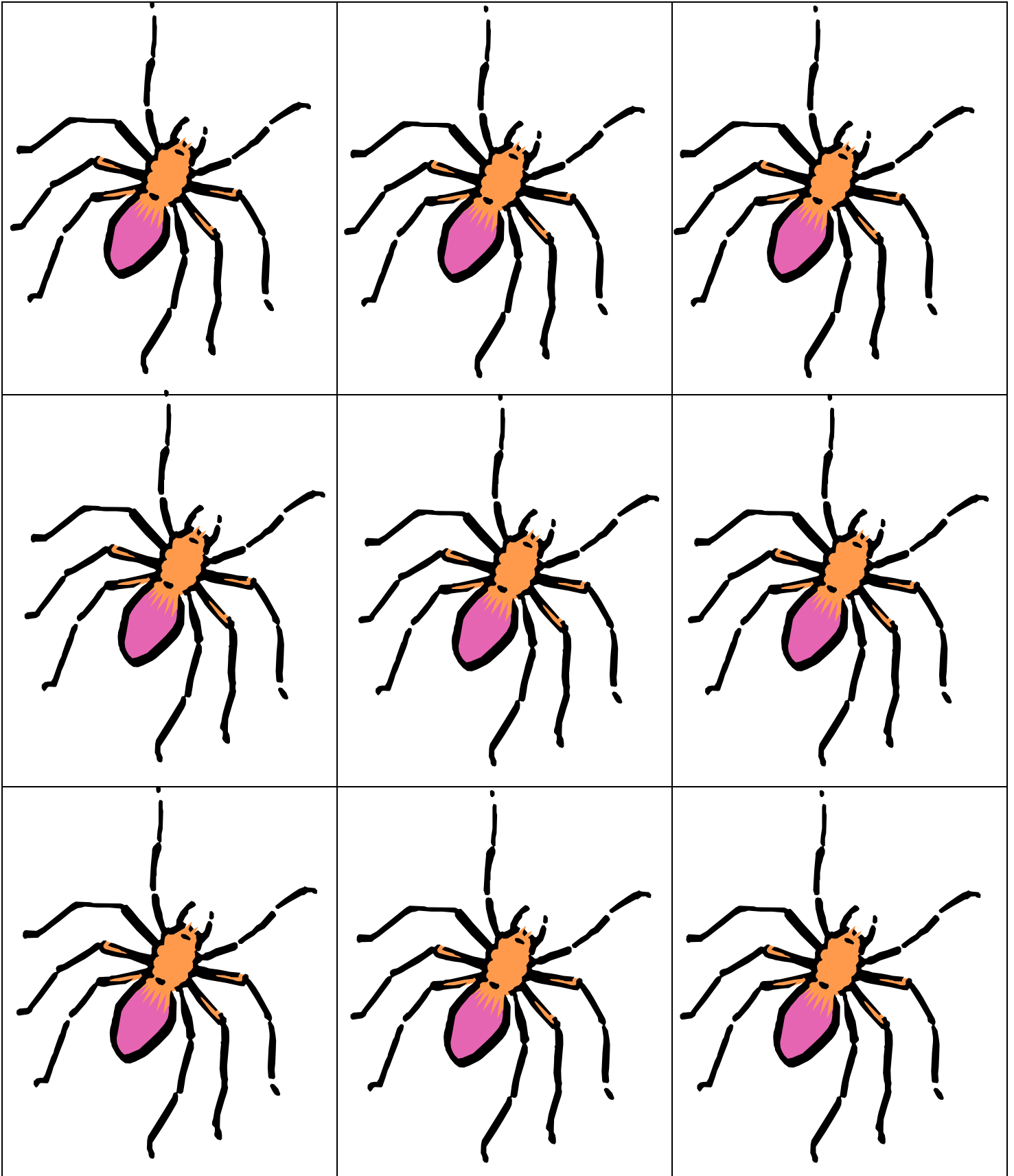
3. Write the word INPUT above the left slot and write OUTPUT above the right slot.
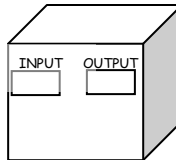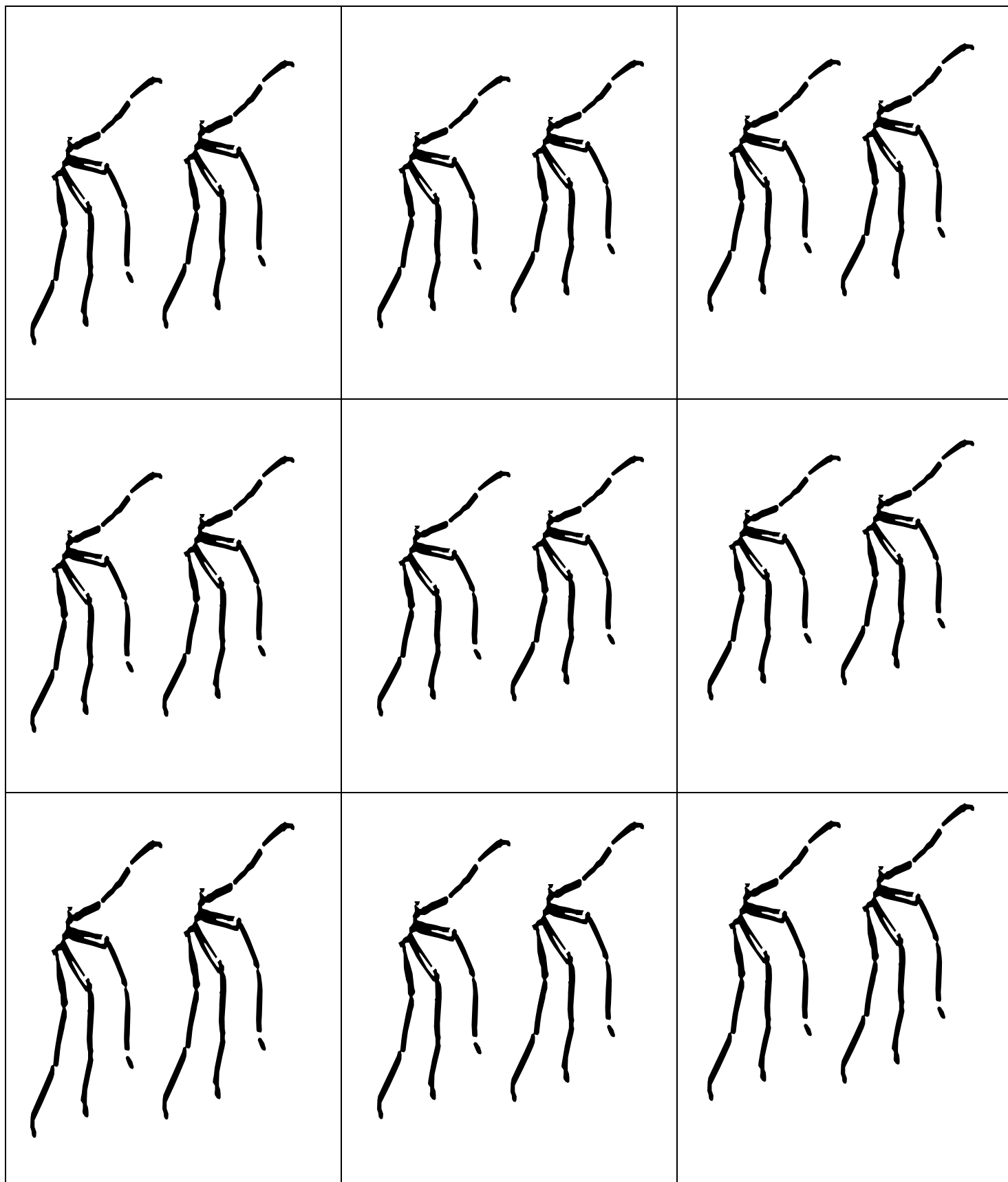
INPUT   OUTPUT

4. Glue the light switch or knob on the side of the box.
(The switch/knob can be turned one way when you are working from input to output and can be turned the opposite way when you work from output to input.

"on"/"off" knob

INPUT   OUTPUT
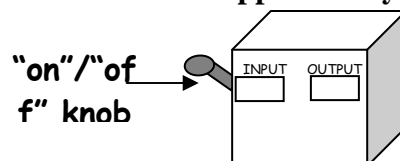
5. Decorate the box as you choose.

The Gatekeeper-Vocabulary Activity

Materials:
Sentence strip (to write definition)
Pictures of objects and numbers that are related and are not related
Hula hoop (optional)
Sign labeled Gatekeeper (for teacher)

Directions:
1. **Define relationship as a connection between two or more things. Display the definition on the board for students to use and refer to. Give students examples of how a mother is connected to a daughter and a sister is connected to a brother. There is a relationship.**
2. **Tell the students that they will be playing a game called Gatekeeper. The teacher will wear a sign labeled "Gatekeeper" and the hula-hoop will serve as the "gate" the students will be allowed to pass or not pass.**
3. **Choose 5 students and pass out pictures of items that are animals and that are not animals (For example: dog, car, cat, building, and horse). The students will stand at the front of the room and hold the pictures so the class can see them.**
4. **Tell the class that you will let some students with their picture pass through the gate (step through the hula hoop) but not all of the students will get to pass through the gate. The class' job is to figure out why some pictures can pass through the gate, but not others.**
5. **Ask students why some could pass. Students should easily conclude that all of the animals could pass. Explain to the students that all of the pictures are connected and related because they are all animals. Refer back to the definition of relationship.**
6. **Follow the procedure above several times to help students see the relationship between other pictures and discuss how the pictures are connected.**
7. **Bridge to numbers and relationships with the last example to prepare students to examine the relationship between the input and output in the function tables. One number example is to give the following numbers to five students: 5, 10, 2, 15, and 17. Allow the students to pass through the gate if their number is divisible by 5 or if they can skip count by 5 to get to that number.**

Lemonade Stand-Output Practice

1. **On Monday's at Larry's Lemonade Stand, 1 cup of lemonade costs 5¢. Complete the function table to show how many cups was bought for the given cost.**

Input	Output
1	5¢
	50¢
	35¢
	20¢

2. **On Tuesday's at Larry's Lemonade Stand, 1 cup of lemonade costs 7¢. Complete the function table to show how many cups was bought for the given cost.**

Input	Output
1	7¢
	49¢
	63¢
	70¢

3. **On Wednesday's at Larry's Lemonade Stand, 1 cup of lemonade costs 2¢. Complete the function table to show how many cups was bought for the given cost.**

Input	Output
1	2¢
	18¢
	20¢
	30¢

4. **On Thursday's at Larry's Lemonade Stand, 1 cup of lemonade costs 9¢. Complete the function table to show how many cups was bought for the given cost.**

Input	Output
1	9¢
	36¢
	45¢
	90¢

5. **On Friday's at Larry's Lemonade Stand, 1 cup of Lemonade costs 6¢. Complete the function table to show how many cups was bought for the given cost.**

Input	Output
1	6¢
	24¢
	36¢
	48¢

6. **On Saturday's at Larry's Lemonade Stand, 1 cup of lemonade cost 10¢. Complete the function table to show how many cups was bought for the given cost.**

Input	Output
1	10¢
	40¢
	50¢
	90¢

Function Table Checklist #1

Student	**Student**	**Student**
has difficulty with/ is able to:	**has difficulty with/ is able to:**	**has difficulty with/ is able to:**
☐ **Identify output when given input**	☐ **Identify output when given input**	☐ **Identify output when given input**
☐ **Identify input when given output**	☐ **Identify input when given output**	☐ **Identify input when given output**
☐ **Compute accurately**	☐ **Compute accurately**	☐ **Compute accurately**
☐ **Verbally explain relationship between input and output**	☐ **Verbally explain relationship between input and output**	☐ **Verbally explain relationship between input and output**
Student	**Student**	**Student**
has difficulty with/ is able to:	**has difficulty with/ is able to:**	**has difficulty with/ is able to:**
☐ **Identify output when given input**	☐ **Identify output when given input**	☐ **Identify output when given input**
☐ **Identify input when given output**	☐ **Identify input when given output**	☐ **Identify input when given output**
☐ **Compute accurately**	☐ **Compute accurately**	☐ **Compute accurately**
☐ **Verbally explain relationship between input and output**	☐ **Verbally explain relationship between input and output**	☐ **Verbally explain relationship between input and output**
Student	**Student**	**Student**
has difficulty with/ is able to:	**has difficulty with/ is able to:**	**has difficulty with/ is able to:**
☐ **Identify output when given input**	☐ **Identify output when given input**	☐ **Identify output when given input**
☐ **Identify input when given output**	☐ **Identify input when given output**	☐ **Identify input when given output**
☐ **Compute accurately**	☐ **Compute accurately**	☐ **Compute accurately**
☐ **Verbally explain relationship between input and output**	☐ **Verbally explain relationship between input and output**	☐ **Verbally explain relationship between input and output**

Directions to Make Individual Magic Function Machines

Materials:
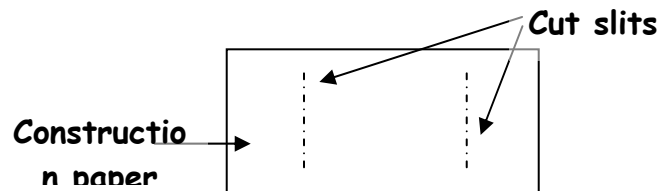**5 in. by 6 in. piece of construction (one per machine)**
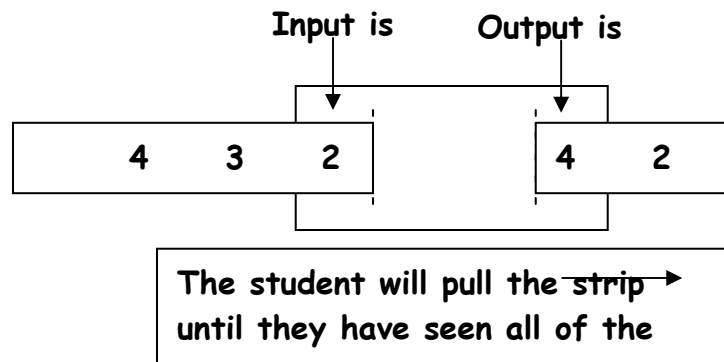**Sentence strips (4 to 5 per group)**
Markers
Scissors

Directions:

1. **Cut 2 slits 4 inches long at opposite ends of the construction paper. The slits should be about 4 inches apart.**

   Cut slits

   Constructio
   n paper

2. **Write numbers (the numbers will be the input and output and should be related) spaced out on the sentence strips. The numbers must be written on the sentence strips as shown below so that the strips will pass through the construction paper in such a way that the input and its output will be displayed at the same time. The example below shows the inputs and outputs where the rule is multiplied the input times 2.**

   inputs

   Sentenc
   e strip

   4   3   2   1   8   6   4   2

   output
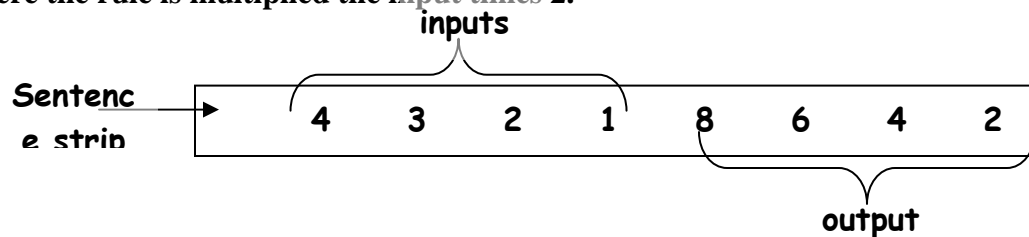
3. **Weave the sentence strip through the first slit and out the second slit on the construction paper. Each number sentence strip will create one function table and students will look at the numbers to determine the rule. Students will record the inputs and outputs on a function table-recording sheet, Student Resource 6, and then record the rule for the function table.**

   Input is   Output is

   4   3   2   4   2

   The student will pull the strip
   until they have seen all of the

Function Table Checklist #2

Student

_____

has difficulty with / is able to

o **Identify rule within the function table**
o **Explain why his/her rule is correct**
o **Correctly apply rule to function table**

Student

_____

has difficulty with / is able to

o **Identify rule within the function table**
o **Explain why his/her rule is correct**
o **Correctly apply rule to function table**

Student

_____

has difficulty with / is able to

o **Identify rule within the function table**
o **Explain why his/her rule is correct**
o **Correctly apply rule to function table**

Student

_____

has difficulty with / is able to

o **Identify rule within the function table**
o **Explain why his/her rule is correct**
o **Correctly apply rule to function table**

Student

_____

has difficulty with / is able to

o **Identify rule within the function table**
o **Explain why his/her rule is correct**
o **Correctly apply rule to function table**

Student

_____

has difficulty with / is able to

o **Identify rule within the function table**
o **Explain why his/her rule is correct**
o **Correctly apply rule to function table**

Student

_____

has difficulty with / is able to

o **Identify rule within the function table**
o **Explain why his/her rule is correct**
o **Correctly apply rule to function table**

Student

_____

has difficulty with / is able to

o **Identify rule within the function table**
o **Explain why his/her rule is correct**
o **Correctly apply rule to function table**

Student

_____

has difficulty with / is able to

o **Identify rule within the function table**
o **Explain why his/her rule is correct**
o **Correctly apply rule to function table**

Answer Key for Student Resources

Student Resource Sheet #1

Number of Spiders	**1**	**3**	**6**	**9**
Number of Legs	**8**	**24**	**48**	**72**

Number of Dogs	**Number of Legs**
1	**4**
2	**8**
3	**12**
4	**16**

Student Resource Sheet #4, Spinner-Function Tables
Answers will vary depending on the rule the student spins. The rules on the spinner are: divide by 6, multiply 10, add 8, multiply 5, add 23, and multiply 3.

Student Resource Sheet #7

1. **D $153**
2. **B 4**

3. **Part A**
   Multiply the Input times 7
   Part B
   Below is one possible student response.
   When I look at the input and the output I notice that the output is increasing. I know when the output increases you have to add to the input or multiply a number times the input. I know that 6 x 7 = 42. The rule is to multiply the input by 7. I can check my rule by:
   8 x 7 = 56
   11 x 7 = 77
   13 x 7 = 91